

SELF-POWERED MOTORIZED WINDOW AWNING

BACKGROUND OF THE INVENTION

[0001] This invention relates generally to roll-up awnings, and in particular to awnings used for buildings, travel trailers, or recreational vehicles, and specifically to an awning roller assembly with a self-contained power source and a motor embedded within a roll-up tube for deploying and retracting the awning.

[0002] It has long been recognized that roll-up awnings are useful in the recreational vehicle field, as well as for homes and businesses. Such awnings are particularly useful when trailer homes or recreational vehicles are parked at a campsite. While parked, there is a need for a protected area in which users may take cover from the sun or inclement weather. A spring-biased, roll-up awning has long been used in the field.

[0003] A roll-up, retractable awning generally comprises either a canopy connected at one edge to the wall of a building or recreational vehicle, and at the opposite edge connected to a roller tube, or a roll-up tube fixed to the side of the wall with the edge of the canopy connected to a horizontal rod connected to support arms. For the fixed roller tube, the support arms may be spring-loaded so that the arms extend the end of the canopy outward when the canopy is deployed. For the non-fixed tube design, the roller tube is typically pivotally supported by extended support arms which are pivotally mounted to the wall. In both designs, in a stowed position, the canopy is rolled about the roller tube and secured to the wall.

[0004] In the deployed position, the support arms must not only support the weight of the canopy, but also the weight of other attachments (such as a screen or a valance and perhaps any motors), as well as resist the forces of nature (such as wind and rain).

[0005] As described above, retractable awnings may have either a stationary roller tube mounted to the wall, or a roller tube that is extended outward by the support arms. When not deployed, the awning canopy is typically rolled around the tube for storage and, if used on a vehicle, for travel.

[0006] Retractable awnings can be manually operated, or they may utilize a motor to make extension and retraction automated and quicker. The motor may be positioned on one of the arms, outside the roll tube, or as disclosed in application serial number 10/237,912, filed on or about November 9, 2002, incorporated herein by reference. According to that reference, the motor may be partially or fully inserted into the roll-up tube. This can protect the motor from the elements, and allow a wider awning canopy that might be possible using an arm-mounted motor. Further, an in-the-tube motor can be more aesthetically pleasing to the user.

[0007] However, a motor-operated awning requires that power of some sort be provided to the motor. A motor could be electrically powered or hydraulically powered, for example. Hydraulically powered awnings typically require an electrical power supply to drive a compressor. Thus, electrical power is typically necessary for a powered awning of any type.

[0008] Because electrical power is necessary for a powered awning, retrofit awnings often require that the wall of the building or vehicle for mounting the awning be penetrated for electrical wires to be installed and connected to the vehicle or building electrical system. This can expose the wall and the interior to the elements and it will destroy the integrity of the wall (especially an issue if the awning is removed). Further, such installation may require excessive installation labor, and leads to potential failure points. Thus, a self-powered awning that need not be connected to the vehicle or building electrical supply would be beneficial.

[0009] Further, an awning operated on a vehicle might require the running of a noisy and polluting generator, irritating the user and nearby

individuals, or it might require the use of the vehicle's power supply to power the awning, thus running the risk of depleting a vehicle battery. Thus, some other means of powering the awning would be useful to avoid these problems.

SUMMARY OF THE INVENTION

[0010] Provided is a self-powered awning for mounting on a wall, the awning comprising: a roll-up tube; a drive assembly at least partially inserted into the roll-up tube for deploying and retracting the awning; and a solar panel for generating electrical power for powering the drive assembly.

[0011] Also provided is a self-powered awning comprising: a roll-up tube; a canopy attached to the roll-up tube; a drive assembly for deploying or retracting the awning; a solar panel fixedly mounted on a wall for generating electrical power for powering the drive assembly.

[0012] Further provided is a self-powered awning comprising: a wall mounting assembly fixed to a wall, the wall mounting assembly including a roll-up tube rotatably attached to the wall mounting assembly; a canopy rod; a canopy having an inner end connected to the roll-up tube and an outer end connected to the canopy rod; a support arm including: a first end connected to the wall; a second end connected to the canopy rod; at least one joint assembly between the first end and the second end; and a biasing spring for biasing the support arm outward from the wall about the joint assembly. The awning also comprising: a drive assembly for deploying or retracting the awning; a rechargeable battery for providing electrical power for powering the drive assembly; and a solar panel for generating electrical power for storing in the rechargeable battery and/or for powering the drive assembly.

[0013] Still further provided is a self-powered awning comprising: a wall mounting assembly fixed to a wall; a first and a second support arm each connected to the wall; a roll-up tube rotatably attached to the first support arm at one end of the tube; a canopy having an inner end connected to the wall mounting assembly and an outer end connected to the roll-up tube. The

awning also comprising: a drive assembly attached to the second support arm and at least partially inserted into another end of the roll-up tube for deploying or retracting the awning; a rechargeable battery for providing electrical power for powering the drive assembly; and a solar panel for generating electrical power for storing in the rechargeable battery and/or for powering the drive assembly.

[0014] Even further provided is a self-powered awning comprising: a roll-up tube rotatably fixed to a wall; a canopy rod; a canopy having an inner end connected to the roll-up tube and an outer end connected to the canopy rod; a support arm including: a first end connected to the wall; a second end connected to the canopy rod; at least one joint assembly; and a biasing spring for biasing the support arm outward from the wall about the joint assembly. The awning also comprising: a drive assembly at least partially inserted into the roll-up tube for deploying or retracting the awning; a rechargeable battery for providing electrical power for powering the drive assembly; and a solar panel for generating electrical power for storing in the rechargeable battery and/or for powering the drive assembly.

[0015] And further provided is a self-powered awning comprising: a wall mounting assembly mounted on a wall; a first and a second support arm each attached to the wall; a roll-up tube having one end connected to the first support arm; a canopy having an inner end connected to the wall mounting assembly and an outer end connected to the roll-up tube. The awning further comprising: a drive assembly attached to the second support arm and at least partially inserted into another end of the roll-up tube for deploying or retracting the awning; a rechargeable battery for providing electrical power for powering the drive assembly; and a solar panel fixedly mounted on the wall mounting assembly for generating electrical power for storing in the rechargeable battery and/or for powering the drive assembly.

[0016] And still further provided is a self-powered awning comprising: a roll-up tube rotatably fixed to a wall; a canopy rod; a canopy having an inner

end connected to the roll-up tube and an outer end connected to the canopy rod, wherein the canopy can be wound on the roll-up tube by rotating the tube in a wind direction for retracting the awning and unwound from the roll-up tube by rotating the tube in an unwind direction to deploy the awning; at least two support arms, each support arm including: a first end connected to the wall; a second end connected to the canopy rod; and at least one joint assembly, wherein at least one support arm further includes a biasing spring for biasing the support arm outward from the wall about the joint assembly.

[0017] The outward biasing of the support arms tends to deploy the awning and keep the canopy taught when the roll-up tube is rotated in an unwind direction to deploy the awning.

[0018] The awning also comprising: a motorized drive assembly at least partially inserted into the roll-up tube, wherein the drive assembly is for winding or unwinding the roll-up tube; a rechargeable battery for providing electrical power to the drive assembly; and a solar panel for generating electrical power for storing in the rechargeable battery and/or for powering the drive assembly.

[0019] Additionally provided is a self-powered awning comprising: a wall mounting assembly fixed to a wall; a roll-up tube rotatably fixed to the wall mounting assembly; a canopy rod; a canopy having an inner end connected to the roll-up tube and an outer end connected to the canopy rod, wherein the canopy can be wound on the roll-up tube by rotating the tube in a wind direction for retracting the awning and unwound from the roll-up tube by rotating the tube in an unwind direction to deploy the awning.

[0020] The awning further comprising: at least two support arms, each support arm including: a first end connected to the wall; a second end connected to the canopy rod; and at least one joint assembly; a motorized drive assembly at least partially inserted into the roll-up tube and rotationally connected to the roll-up tube, wherein the drive assembly is for winding or

unwinding the roll-up tube to deploy or retract the awning; a rechargeable battery for providing electrical power to the drive assembly; and a solar panel fixedly mounted on the wall mounting assembly for generating electrical power for storing in the rechargeable battery and/or for powering the drive assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIGURE 1 is a diagram showing an awning with a fixed roller tube connected to a wall in a partially deployed condition;

[0022] FIGURE 2 shows an awning with a roller tube connected to support arms connected to a wall in a partially deployed condition;

[0023] FIGURE 3 shows a self-powered, motorized version of the awning of figure 1;

[0024] FIGURE 4A shows a close-up of a possible support arm as used in one of the embodiments;

[0025] FIGURE 4B shows a close-up of another possible support arm as used in one of the embodiments;

[0026] FIGURE 5 shows an example of an in-the-tube motor design that might be used for the awning of figure 3.

Detailed Description of the Preferred Embodiments

[0027] FIGURE 1 shows a possible embodiment of an awning 1A in an at least partially deployed state. The awning has a canopy 5 for protecting a user from the elements. The awning also has a pair of support arms 10 and a wall mounting assembly 12, both fixedly connected to a wall 2. The canopy 5 is at least partially rolled up on, and connected on an inner end to, a roll-up tube 14. The roller tube may be a hollow tube, or could be solid, if desired.

The canopy 5 is preferably waterproof, and typically will be at least partially opaque to provide sun protection. The awning roll-up tube 14 preferably has a motor assembly at least partially inserted inside the roll-up tube 14 (see FIG. 5), with the roll-up tube 14 rotatably fixed to the wall mounting assembly 12, which means that the roll-up tube can rotate with respect to the wall mounting assembly, but it typically would not move away from the wall in a linear direction during operation. Accordingly, the roll-up tube can also rotate with respect to the wall, but will not move away from the wall as the awning deploys.

[0028] The embodiment of FIGURE 1 also shows that each support arm 10 is connected to the wall 2 at one end. Another end of the support arm 10 is connected to a canopy rod 16. The outer end of the canopy 5 is connected to the canopy rod 16. Each support arm 10 has at least one joint assembly 7A for rotating the support arm 10 in an outward direction with respect to the wall, for deploying the awning.

[0029] The awning of FIGURE 1 is deployed by unrolling the roll-up tube 14, such as by operating a motor or, alternatively, by releasing a brake. The roll-up tube may have an internal spring to help rotate the tube in one or the other directions, or it may rely on a motor for each direction, or both. Typically, the configuration of FIGURE 1 uses support arms 10 that are spring loaded to bias the arms in an outward direction. Thus, when the roll-up tube 14 is unwound, the awning deploys through the bias force of the springs in the support arms 10, which causes the support arms 10 to swing outward from the wall about the joint assemblies 7A (see FIGURE 4 and accompanying description), hence unwinding the canopy and keeping the canopy in tension, thereby deploying the awning.

[0030] The alternative embodiment of FIGURE 2 shows an awning 1B having a roll-up tube 24 that is mounted to the support arms 20. A wall-mounting assembly 22 is fixed to the wall, and the inner end of the canopy 5 is fixedly connected to the wall mounting assembly 22. In this embodiment,

the roll-up tube 24 is not fixed to the wall 5, but can move outwardly from the wall 2, via the support arms 20.

[0031] The deployment of the embodiment of FIGURE 2 is similar to that of FIGURE 1, in that the roll-up tube is unwound through the action of a motor, or a spring in combination with the release of a brake, or both. Because of the weight of the canopy 5 and the roll-up tube 14, the support arms 20 may not need a spring for bias, or may use a spring bias that is less than that used for the embodiment of FIGURE 1. Further, various other types of biasing springs may be used to help deploy the awning. Accordingly, in the embodiment of FIGURE 2, the roll-up tube moves away from the wall as the awning deploys.

[0032] The awnings of either FIGURE 1 or FIGURE 2 can utilize a variety of support arm designs or roll-up tube designs (including hollow or solid roll-up tubes, for example). Further, the wall mounting assemblies can be of various designs as well.

[0033] FIGURE 3 shows a wall mounting assembly 12 that is used for a self-powered awning using the embodiment of FIGURE 1. A similar structure could be used for the wall mounting assembly 22 of the embodiment of FIGURE 2.

[0034] In the embodiment of FIGURE 1, the wall mounting assembly 12 has a rechargeable battery 32, and one or more solar panels 34, for charging the rechargeable battery 32. Conduit 35 might be used to hold electrical wires for connecting the rechargeable battery 32 with a drive assembly 36 (only partially shown, with substantial portion inserted into the tube 14). The conduit 35 need not be used with the embodiment of FIGURE 2. For the embodiment of FIGURE 1, the roll-up tube 14 is connected to the wall mounting assembly 12, and the drive assembly 36 is at least partially inserted into, and hidden by, the roll-up tube 14, and is also connected to the wall mounting assembly (see FIGURE 5 and accompanying text for more detail on

the drive assembly). Obviously, the roll-up tube must be at least partially hollow for an embodiment that is to accept a motor inserted therein.

[0035] For the embodiment of FIGURE 2, the wall mounting assembly 22 will not have the roll-up tube connected thereto, but will instead have the inner end of the canopy connected to it. This embodiment also will use one or more solar panels and a rechargeable battery for powering the drive assembly.

[0036] For both embodiments, the one or more solar panels 34, each of which likely contain a plurality of solar cells, are positioned so that they can receive sunlight or other ambient light whether or not the awning is deployed. The rechargeable battery 32 may be directly connected to the solar panel(s) 34, or some voltage adapting circuit may be transposed between them to condition the voltage output of the solar panel(s) 34 to be compatible with the rechargeable battery 32. Further, protection circuits may be utilized in order to avoid overcharging the rechargeable battery, or improperly reverse biasing the solar panels.

[0037] Also for both embodiments, the rechargeable battery 32, alone or in combination with the solar panel(s) 34, is used to power the motor of the awning 1 for either deploying or retracting the awning, or both. Further, the combination of the rechargeable battery 32 along with the solar panel(s) 34, allows the awning to be retro-fitted to the wall 2 without requiring wiring the awning to an external power supply. Accordingly, the awning can be self-contained and self-powered, reducing installation time and avoiding any need to wire the awning to the building or vehicle power supply, as the case may be. Further, no unsightly or harmful penetration of the wall is necessary for running electrical wires, and thus the awning can be removed from the wall with less damage or other impact to the wall itself.

[0038] The primary adaptations for the awning of FIGURE 2 that are required would include running wires along the support arms 20 or the canopy

5, for example, in order to power the motor at least partially inserted within the roll-up tube 24, which, in this embodiment, moves outward during deployment of the awning.

[0039] A control unit (not shown) can also be provided for either embodiment in order to control the deploying and retracting operations of the awning, by controlling the motor of the drive assembly. The control unit will control the operation of the motor, allowing a user to turn the motor on and off, and control the direction of the motor, thereby deploying and retracting the awning. The control unit could be incorporated into the conduit 35, the battery 32, or be interposed between them. Alternatively, the control unit might be mounted elsewhere, and the control wires routed in some fashion (such as through the conduit 35) to the drive assembly 36.

[0040] FIGURE 4A shows a design for at least one support arm 10 used for the embodiments of FIGURE 1 and/or FIGURE 2. FIGURE 4A shows a mounting bracket 44 for mounting the support arm on the wall 2. A biasing spring 42, connected to bracket 44 via bar 45 and joint 46, is located in the support arm 10 (or 20) to bias the awning (typically toward a deployed condition for the embodiment of FIGURE 1, and, if used, optionally toward a retracted position for the embodiment of FIGURE 2). This bias causes the support arms 10 of FIGURE 1 or support arms 20 of FIGURE 2, to move outward from the wall 2, and thus deploy the awning 1A (or 1B), when the motor is operated in the deploy mode. The spring bias also helps to keep the canopy 5 taught in a deployed or partially deployed position. Retracting the awning is done by operating the motor in the opposite direction, which then rolls the canopy 5 onto the roll-up tube 14, and thus pulls in the support arms 10 and re-tensions the spring 42.

[0041] Alternatively, FIGURE 4B shows an embodiment that utilizes a torsion spring 49 for biasing the support arm 10 (or 20) in an outward direction.

[0042] FIGURE 5 shows the drive assembly 36 and the roll-up tube 14 as it would appear before the motor assembly is inserted into the roll-up tube 14 (or 24 of the embodiment of FIGURE 2). The drive assembly 36 has a motor assembly 50 having a transmission linkage disc 52 having notches 58, as shown, for example, at one end of the motor assembly. The motor assembly also has a motor sleeve 54, which covers and protects an electric motor (not shown in FIG. 2) which is inside the sleeve 54, and connected to the disc 52 by a motor shaft. An end support cap 56, along with additional support components not shown (such as mounting hardware to mount to either the wall mounting assembly as in FIGURE 1, or one of the support arms as in FIGURE 2), combined with the motor assembly 50, complete the drive assembly 36.

[0043] During assembly, the motor assembly 50 portion of the drive assembly 36 is at least partially, and can be mostly or fully, inserted into the roll-up tube 10 up to the end support cap 56. The motor assembly 50 is inserted into the roll-up tube 14 at the time of assembly with the end support cap 56 connecting to an end of the roll-up tube 14, providing physical support to the roll-up tube 3. The notches 58 of the disc 52 mate with projections 59, projecting from the interior of the roll-up tubes 14/24. The end support cap 56 connects to, and rotates along with, the roll-up tube 14/24 when the awning is being deployed or retracted.

[0044] In the embodiment of FIGURE 1, the end support cap 56 is either connected to the wall 2 using brackets (not shown), or the cap 56 is connected to the wall mounting assembly 12, which is mounted on the wall 2. Electrical wires (not shown) for powering the electric motor of the drive assembly are run through the conduit 35 to the rechargeable battery 32, likely via the control unit (not shown) for controlling the motor operation. Alternatively, as discussed above, the control unit might be located elsewhere, and control wires routed from the control unit to the drive assembly, 36 in some other manner. As a further alternative, the control unit

could be embedded within the drive assembly 36 and operated via an input or in a wireless manner.

[0045] In the embodiment of FIGURE 2, however, the end support cap 56 would be connected to one of the support arms 20 via a support arm mounting assembly 60, as shown (this assembly 60 is not likely to be used as shown for the embodiment of FIGURE 1). The motor electrical wiring 66 would then be run through the support arm mounting assembly and through the support arm 20, perhaps to a control unit (not shown), and/or eventually to the rechargeable batteries and/or the solar panel(s). Various options for placement of the control unit in this embodiment exist, similar to those described for the embodiment of FIGURE 1.

[0046] The support arm mounting assembly 60 used in the awning of FIGURE 2 can be designed using various options and/or alternatives in order to accommodate alternative roll-up tube and support arm designs, especially in cases where the awning drive assembly is retrofitted to an existing awning. This is especially true with respect to the arm mounting features and the roll-up tube mounting features, which may need to be modified in order to be properly installed onto existing or future awning devices.

[0047] Upon assembly of the awning, the motor assembly 50 is fully, mostly, or at least partially, inserted into the roll-up tube 14/24 sufficient that the notches 58 of the disc 52 at least partially engage the projections 59 shown on the interior of the roll-up tube 14 (and also on the tube 24, not shown). It is expected that as much of the motor assembly 50 as possible will be inserted into the tube to help protect the motor and for aesthetic reasons. However, it is also expected that circumstances may arise whereby some portion of the motor assembly may remain outside of the tube, such as situations where there is some gap between the roll-up tube assembly and a mounting arm.

[0048] By operating the motor in one direction, the awning can thus be made to deploy by causing the roll-up tube to unroll the canopy, whereby the arms will extend the awning and keep the canopy taught. By operating the motor in an opposite direction, the awning can be made to retract by winding the canopy upon the roll-up tube, causing the awning to be pulled toward the support wall, and thus retracting the awning.

[0049] In the embodiment of FIGURE 2, a biasing spring is preferably embedded inside the roll-up tube, or alternatively, inside the support arm mounting assembly, or alternatively, mounted on one or more ends of the roll-up tube. This spring is installed such that the spring biases the roll-up tube 14 into rotating in a direction such that the awning is at least mostly retracted or fully retracted, if desired, such that by releasing the motor (and, perhaps, a brake system), the awning will at least partially retract.

[0050] Further, manual means of operating the awning may also be provided in case of failure of automatic deploying/retracting means, or if the power supply is drained.

[0051] As discussed above, the invention can be used to retrofit an existing awning for automating the deployment and retraction of the awning and/or for embedding much of the motor assembly into the roll-up tube, without requiring the awning to be wired to the vehicle or building electrical system. The invention can also be used for installation on an existing vehicle or building, without requiring connection to the building or vehicle electrical system.

[0052] The invention has been described hereinabove using specific examples; however, it will be understood by those skilled in the art that various alternatives may be used and equivalents may be substituted for elements or steps described herein, without deviating from the scope of the invention. Modifications may be necessary to adapt the invention to a particular situation or to particular needs without departing from the scope of

the invention. It is intended that the invention not be limited to the particular implementation described herein, but that the claims be given their broadest interpretation to cover all embodiments, literal or equivalent, covered thereby.